Continuous Water-quality Monitor Installation Example: An Air Purge System to Reduce Sediment Fouling and Improve Data Quality

Alexandra Etheridge
Hydrologist

Marshall Williams
Biologist

USGS
230 Collins Rd
Boise, ID 83702
Telephone: 208-387-1357
Email: aetherid@usgs.gov

The U.S. Geological Survey (USGS) operated a continuous water-quality monitor at the Boise River near Parma in southwest Idaho during water-years (WY) 2009-10 and from WY2014-present. Water temperature, specific conductance, dissolved oxygen, and turbidity are measured every 15 minutes using a YSI 6920-V2 multi-parameter water-quality sonde. During WY2009-10, the sonde was attached to a bank-mounted, sliding metal I-beam and was not enclosed in a pipe. When the sonde was re-deployed in WY2014, it was deployed in a bank-mounted pipe to allow easier sensor access for one person. Although the sonde was installed in the same location during both deployment periods, fouling from fine sediments became a problem following redeployment in WY2014. Sediment fouling may have been the result of changes in flow dynamics subsequent to channel scour that occurred in 2011 or the relatively calm environment within the deployment pipe that facilitated sediment deposition.

In March 2015, an air purge system was installed using about $300 in hardware, including an air compressor, fittings, and tubing. The system purges air into the end of the pipe 4 times per day for 2 minutes at a time and 10 minutes prior to the next scheduled parameter readings. The air purge system reduced the number of cleaning service visits from 28 in 2014 to 12 in 2015, and it saved an estimated $10,000 in operational costs during 2015. Better data quality also was observed for turbidity and specific conductance, which are most affected by sediment fouling. Turbidity and specific conductance are used as input variables to surrogate regression models developed using 2009-10 data and published in a peer-reviewed report. Existing surrogate models can be invalidated if the sonde is moved to a different location or with excessive fouling at the existing location, and the air purge system has allowed us to maintain the validity of the existing surrogate models. Design features of the air purge system will be discussed and examples of data-quality improvements will be provided.